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ABSTRACT

This paper describes a study undertaken to examine how four variables (domain knowledge, topic knowledge, individual interest, and situational interest) impact recall of information from a hypertext environment. Participants in the study were 107 undergraduate and graduate students enrolled in the School of Education at a large northeastern university. Materials for this investigation included: (1) an open-ended assessment of domain knowledge; (2) an assessment of individual interest; (3) an assessment of situational interest; (4) a 150 card hypertext document; (5) a structured recall assessment; and (6) an unstructured recall assessment. Students were first administered the knowledge and interest assessments. Next, students were given an overview and tutorial on the hypertext environment. Students studied the text, then were administered the recall assessments. Multiple regression analyses were performed to analyze the relationships among variables and results. Findings indicated that domain knowledge significantly predicts reading recall. The influence of topic knowledge on reading recall, however, highlighted differential prediction patterns based on the amount of prior topic knowledge the individuals possessed. Neither interest measure significantly predicted reading recall. Hypertext navigation, in conjunction with varying levels of topic knowledge, appeared to impact the amount and type of information recalled. (DLS)

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Knowledge, Interest, Recall and Navigation: A Look at Hypertext Processing

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Abstract

An abundance of information in the classroom is conveyed to students through text-based resources. Written discourse is actually the primary information source in secondary classrooms. Research concerning text processing and recall of texts that are traditional in nature (e.g., textbooks, magazine articles, narratives) has highlighted the important influence of a reader's prior knowledge and interest in a given domain on reading performance. However, as the amount of technology used for instructional purposes increases, more students will increasingly be presented with computer-based texts, such as hypertexts. Research examining the roles of variables like knowledge and interest in these nonlinear reading environments has been scarce. The present investigation was undertaken to study how these variables impact recall of information from a hypertext environment. Results indicate that domain knowledge significantly predicts reading recall. The influence of topic knowledge on reading recall however highlighted differential prediction patterns based on the amount of prior topic knowledge the individuals possessed. Hypertext navigation, in conjunction with varying levels of topic knowledge, appeared to impact the amount and type of information recalled.

An abundance of information in the classroom is conveyed to students through text-based resources. Written discourse is actually the primary information source in secondary classrooms (Garner, 1992). Although texts play an important role in the education of students, not all students reap the same benefits from texts. How readers process text may be, in part, attributable to the amount the reader knows about the topic or domain represented in the text, and how motivated or interested the reader is to attend to the information being discussed (Alexander, 1992; Alexander, Kulikowich & Schulze, 1994).

Several different terms representing the construct of knowledge have been presented in the literature on reading (Alexander, Schallert & Hare, 1991). Among these terms are domain knowledge and topic knowledge. By definition, *domain knowledge* is all known information related to a field of study, such as physics, mathematics, or psychology (Alexander, Pate, Kulikowich, Farrell, & Wright, 1989). One consistent finding supported by the literature is that the more domain knowledge that one has, the better one can employ strategies to competently process related text (Alexander, 1992; Alexander & Judy, 1988). *Topic knowledge*, by contrast, covers a much smaller range than domain knowledge. Topic knowledge pertains to knowledge of specific concepts that are encountered in text or connected discourse (Garner & Gillingham, 1991). In general, what a reader knows about a text topic will determine what and how much is recalled from that text (Anderson, 1984; Bransford, 1979).

Interest in a given domain has also been found to influence the amount of time and attention a student will devote to a particular reading exercise (Garner, Gillingham & White, 1989; Hidi & Baird, 1986; Tobias, 1994, 1995). *Individual interest* has been described as interest in a domain or content area (Hidi & Baird, 1988). Alexander (in press) extended this definition to include a deep-seated investment in the pursuit of related knowledge. Research has illustrated that individual interest and text recall have a linear relationship (Schiefele, 1991). That is, as individual interest increases, so does recall.

A second type of interest, *situational interest*, pertains to interest in specific features of text, such as pictures or illustrations (Hidi, 1990). Whereas individual interest is enduring in nature, situational interest is a temporary arousal, tied to transient features of the current situation represented in text (Anderson, Shirey, Wilson & Fielding, 1987; Kintsch, 1980). Recent research has shown that high amounts of situationally induced interest can

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be detrimental to reading recall (e.g. inclusion of interesting, but unimportant details). Readers may attend to information that is situationally interesting but that is of little importance for understanding the content of the text (Garner, 1992; Lawless & Kulikowich, 1994).

A large amount of research has also examined the interplay between the constructs of knowledge and interest during the process of reading. In a review of knowledge and interest literature, Tobias (1994) emphasized that,

> it seems unrealistic to assume that there is, or should be, little relationship between domain knowledge and interest. People with high interest in anything have probably acquired more knowledge about that subject, because they are likely to spend much more time on activities related to that field than those less positively disposed toward it (p. 44).

Statement of the Problem

The research discussed above has only examined texts considered to be traditional in nature, such as magazine articles, narratives or textbooks. As the amount of technology used for instructional purposes increases, more students will increasingly be presented with computer-based texts, such as hypertexts. Hypertexts differ dramatically from traditional texts in that they afford the reader the opportunity to interact with the text. Rather than prescribing a predetermined order in which information is to be acquired and comprehended, as traditional texts do, hypertexts allow the reader to make decisions about both what information to access, and the sequencing of this information (Landow, 1992). Essentially, a reader must navigate the terrain of a hypertext, thereby arranging his or her own unique text.

Although the opportunity to select the sequencing and type of information is an advantage of hypertexts over traditional texts, it may also place an added burden on readers. When reading a hypertext, students must be able to identify what information is needed to enhance comprehension and where to find that information. Some researchers have suggested that these navigational decisions may present difficulty to readers who do not possess a requisite amount of domain knowledge or topic knowledge, or who are not interested in the content area (i.e., lack individual interest) (Alexander, Kulikowich & Jetton, 1994; Lawless & Kulikowich, 1994).

Hypertexts also appear to have more dimensionality than do traditional texts. That is, hypertexts include many special effects such as digitized movies, sound and visual effects, and graphics. These special features appear to enhance hypertext, making it richer and more complex (Carver, Lehrer, Connell, & Erickson, 1992), and may also increase situational interest. However, this heightened state of situational arousal may cause students to seek out these special features, perhaps at the expense of the instructional content (Lawless & Kulikowich, 1994). As such, it appears that the amount of situational interest an individual has in the computerized environment and its special features may also affect navigation and recall.

The purpose of this investigation was to extend the findings of prior research on knowledge and interest in traditional text processing to more deeply examine the role of these variables in hypertext processing. Specifically, this study examined the relationships among domain knowledge, topic knowledge, individual interest and situational interest within the context of a hypertext environment. Additionally, the relationship among these variables and text recall was examined.

Methodology and Procedures

Participants in this study included 107 undergraduate and graduate students enrolled in the School of Education at a large Northeastern university. This pool of participants was chosen because it was deemed that these participants would have varying knowledge levels of the basic psychology topics that represent the information in the materials used in this study. Further, this sample of individuals comprised a group of students who were considered competent readers (i.e., as determined by academic performance and university enrollment qualifications). Additionally, not one of the participants indicated a reading disability that might interfere with participation in this study.

Materials for this investigation included the following: 1) nine-item open ended assessments of domain knowledge; 2) nine-item assessment of individual interest; 3) nine-item assessment of situational interest; 4) a 150 card hypertext document; 5) a structured recall assessment; and, 6) an unstructured recall assessment. After adjusting for attenuation, reliabilities for knowledge and interest measures all exceeded .75. Interrater agreement concerning the scoring of these assessments were better than 85% in all cases.

Students were first administered, in counterbalanced order, the knowledge and interest assessments. After completing these measures, students were then given a brief overview and tutorial about the hypertext environment

including information on how they could access subfields of the text and revisit previous sections of the text as they saw necessary. Students were instructed to study the text and self-selected subfields as carefully as they could for they would be asked a series of questions at the end of their session. These questions were designed to direct students to recall as much of the information from the text as they could.

Results

A series of standard multiple regression analyses was performed to analyze the relationships among knowledge, interest and recall constructs. The use of multiple regression was warranted in this investigation because the examination of the partial correlation coefficients allows for the interpretation of the relationships between independent variables and the corresponding dependent variable while holding all other variables in the analysis constant (Tabachnick & Fidell, 1989). As such, the partial correlation coefficients reveal the unique relationships between constructs by parsing out the variance shared by other variables in the analysis.

Results indicated a significant parital correlation between domain knowledge and individual interest ($r=.28$, $p<.05$), after adjusting for attenuation. However, no significant relationship was identified between domain knowledge and situational interest. When recall measures were used as the dependent variables, domain knowledge was found to be significant predictor of both structured and unstructured recall (partial $r=.285$, $p<.05$, partial $r=.414$, $p<.01$, respectively). However, when topic knowledge was used as the predictor of recall performance, the topic area were participants had more prior knowledge was a significant predictor of structured recall ($t_{96}=2.54$, $p<.01$), whereas the lower knowledge topic area predicted unstructured recall ($t_{96}=2.36$, $p<.05$). Neither interest measure significantly predicted reading recall from the hypertext document.

These results concur, in part, with prior literature on traditional reading environments. That is, domain knowledge has a powerful influence on the amount of information recalled regardless of the media used to present the text. However, the lack of ability to identify a significant relationship between interest and reading recall, in conjunction with the differential pattern of recall associated with topic knowledge areas calls into question whether students use the same strategies when acquiring information from hypertexts as they use with traditional texts. Review of the navigational data of participants through information space afforded by the hypertext highlights that the novel relationships among knowledge, interest and recall constructs in this study might be attributable the various methods of navigation selected by participants. It appears that higher knowledge learners selected and sequenced information more efficiently, thereby facilitating text recall. However, low knowledge readers seemed to have difficulty making associations between informational units from the hypertext environment. Additionally, these readers allocated more time to the special features of the text (e.g., movies, sound effects...) --often times at the expense of more important informational content.

Educational and Scientific Implications

Studying hypertext processing is not a simple undertaking. There are many variables to consider and many types of technological features that can be studied. However, as the information age continues to present learners with environments that house an abundance of materials and resources, it would seem most important to explore the relationships among variables that will facilitate human processing. Navigational strategies appear to be critical to the effective processing of computer-based texts such as hypertexts. As such, researchers need to continue to address the role of navigational strategies and the interaction of these strategies with cognitive and affective variables.

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